MONTHLY WEATHER REVIEW,

AUGUST, 1877.

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

The present REVIEW for the month of August depends upon all data received up to the 14th of September from the Canadian Meteorological Service, the United States Navy, the Army Post Surgeons, Voluntary Observers and the United States Signal Service. The most interesting features have been: First, the unusually low barometric pressure over the Atlantic and Gulf States. Second, the general excess in temperature. Third, the large number of heavy local rains. Fourth, the general deficiency of rain in the Middle States, and consequent droughts.

BAROMETRIC PRESSURE.

In General.—The general distribution of barometric pressure for the month is shown by the isobars on Chart II, from which it will be seen that the highest pressure has been off the South Atlantic coast, a small portion of which is included in the isobar of 30.00. The pressure has diminished very regularly from the coast in a northwest direction to Dakota, where the lowest average for the month is found. There has been a general deficiency in pressure, which is the most decided in the South Atlantic and Gulf States, where the mean barometer is the lowest it has been since the organization of the meteorological division of the Signal Service. The pressure in the Rocky Mountains and on the Pacific coast has been nearly normal.

Barometric Range.—The greatest range of the barometer over the whole country east of the Rocky Mountains, was about 1.09 inches, as may be seen from the following table, which gives the maximum and minimum pressures that occur on the tri-daily maps near the centres of the respective areas of high and low barometer:

LOW AREAS.				HIGH AREAS.			
No.	Location.	Date.	Minimum Pressure.	No.	Location.	Date.	Maximum Pressure.
I	Fort Garry	Aug. 1st, 7:35 a. m	29.67	I	Father Point	Aug. 1st, 7:35 a. m	30.32
II	Chatham	Aug. 4th, 4:35 p. m	29.54	II	Breckenridge	Aug. 2nd, 7:35 a. m.	30.22
III	Bismarck	Aug. 4th, 4:35 p. m	29.44	III	Augusta	Aug. 12th, 7:35 a. m	30.13
IV	Bismarck	Aug. 9th, 4:35 p. m Aug. 10th, 4:35 p. m	29.62	IV	Sydney	Aug. 26th, 11 p. m	30.38
V	Bismarck	Aug. 15th, 4:35 p. m	29.69	V	Breckenridge	Aug. 31st, 11 p. m	30.25
VI	Omaha	Aug. 17th, 4:35 p. m	29.71				
VII	Bismarck	Aug. 19th, 11 p. m Aug. 20th, 7:35 a. m	29.29				
VIII	Bismarck	Aug. 23rd, 4:35 p. m	29.40				
IX	Bismarck	Aug. 25th, 11 p. m	29.39				
X	Bismarck	Aug. 30th, 4:35 p. m	29.56				

The greatest local barometric ranges have been, as follows: 0.84 at Pembina, 0.72 at Breckinridge and Fort Dodge, 0.68 at North Platte, 0.70 at Eastport.

The least local barometric ranges have been as follows: 0.16 at Los Angeles, 0.17 at San Diego; 0.18 at Yuma; 0.19 at Key West; 0.32 at Galveston; 0.34 at Indianola; 0.37 at St Marks and San Antonio; 0.38 at Jacksonville, New Orleans, Corsicana and Fort Gibson; 0.39 at Shreveport and Jacksboro. An examination of the foregoing table shows that during August the least ranges have, in general, been near the coast, and the greatest in the plateau east of the Rocky Mountains.

Areas of High Pressure in General.—The areas of high pressure during the month have been due, in part, to the encroachments of the general area of high pressure that exists during the summer months in the North Atlantic ocean, and in part to cold, dry air flowing from the Rocky Mountain region in British America and entering the United States near Dakota and Minnesota—generally in rear of areas of low barometer. There also have been several instances of a marked rise of the barometer in advance of areas of depression, where the supply of air was not apparently obtained from either of the two sources above mentioned. This was notably the case when the barometer rose in Tennessee and the Ohio valley in advance of depression No. VII, as described in high area No. IV.

No. I.—This is the pressure described as No. VII in the July REVIEW. On the morning of the 1st it was highest near Father Point, Canada, the isobar of 30.30 extending into eastern Maine, and the isobar 30.20 nearly surrounding New England. It slowly extended along the north Atlantic coast, and disappeared as a high pressure on the 3rd, with southerly winds, in advance of low barometer No. I.

No. II.—The barometer rose on the 2nd in the Northwest and Upper Lake region, in rear of low pressure No. I, and moved in an easterly direction over the Lake region, with cold northerly winds, and, on the 4th and 5th, slowly extended to the East Gulf and South Atlantic coast, giving rise to the southerly winds that prevailed on the 6th and 7th from that coast to the Lake region. This high area was accompanied by the cold weather that lasted through the first week of August over the country east of the Mississippi river. It disappeared as a high pressure off the South Atlantic coast on the 7th.

No. III.—The pressure rose slightly above the average in the Gulf States on the 10th, and in the South Atlantic States on the 11th, in advance of low pressure No. IV, giving rise to the southerly winds that prevailed from the 10th to the 13th in Tennessee, the Ohio valley and Middle States. It had no movement of translation, and disappeared as a high pressure on the 15th.

No. IV.—This is the most interesting high area of the month; the pressure rose slowly on the 11th and 12th, with winds from the north and west, in Manitoba and the Northwest, in rear of depression No. IV. It remained nearly stationary until the 15th, when it gradually extended to the Gulf States, giving rise to light "northers" in Texas. On the 15th and 16th it extended, with diminishing pressure, into the South Atlantic States, giving rise to the southerly winds that blew from the 15th to 17th, inclusive, in those States. On the 18th, 19th and 20th, the highest pressure slowly moved into the Ohio valley and Lower Lake region, with the barometer rising in advance of depression No. VII. On the 21st the highest pressure was in the *Atlantic coast States and the St. Lawrence valley. On the morning of the 22nd* the highest barometer was near the Middle Atlantic coast, giving rise to southerly winds in the Middle States and New England and to northeast winds in the South Atlantic States. On the 23rd, 24th and 25th the highest pressure moved to Nova Scotia. On the 25th and 26th the pressure rose along the Atlantic coast in advance of depression No IX, then central in the Northwest. On the morning of the 27th the isobar of 30.10 included all the country east of the Mississippi valley, except the Upper Lake region. At 7:35 a. m. of the 28th the isobar of highest pressure, 30.20, had been transferred to the Middle and South Atlantic States and Tennessee. On the 28th and 29th, during the progress of low area No. IX across the Lake region, the highest pressure was transferred to the Gulf States. On the morning of the 30th the isobar of 30.10 included all the Gulf States; it then slowly extended, with diminishing pressure, into the South Atlantic States, and, at 11 p. m. of the 31st, the high area was confined to the coast stations of the two last-named districts.

No. V.—The pressure rose rapidly, in rear of depression No. X, in Manitoba and the Northwest during the night of the 30th, accompanied by cold northerly winds. On the 31st the high barometer extended over the Upper Lake region, Lower Missouri and Upper Mississippi valleys. The further history of this area will belong to the September REVIEW.

Areas of Low Pressure in General.—Ten areas of low pressure are described in the following list, of which six only were sufficiently well-defined to justify the charting of their tracks, as given on Map No. I: The charted tracks of centres of areas of low barometer show that the storms of this month were, in general, confined to the northern States of the Union, and show a decided correspondence with those of previous years. There are three cases where the fall of the barometer on the north Pacific coast taken in connection with the preceding and subsequent wind-directions, justify the belief that the corresponding areas of depression moved from the Pacific slope over the Rocky Mountains into the plateau east of these mountains and north of the Platte river, where their further history is given in Nos. III, IX and X.

No. I.—This depression was described as No. VIII in the July REVIEW. The centre of low pressure was, on the 1st, in Canada, and there is not sufficient data to justify the charting of its track. It disappeared in advance of high pressure No. II. The amount of precipitation, within the limits of the map, was unusually small.

No. II.—There was a marked fall of the barometer in the South Atlantic States on the 2nd, which district was then, in all probability, in the northwest quadrant of an extensive depression, whose centre was off

that coast, and in or near the Gulf stream. Northeast winds prevailed from New York to Florida. The depression moved along the Atlantic coast, accompanied by northeast winds, backing to northwest, until the afternoon of the 4th, when the pressure was lowest in Nova Scotia. At this time, it was apparently merged with the low area described as No. I, which joined it, moving in a southeasterly direction over the St. Lawrence valley. Light, but cold, rains fell at the Atlantic coast stations. Its track cannot be traced with sufficient accuracy to chart.

No. III.—On the 1st and 2d the barometer was low in British Columbia and Washington Territory. On the 2d the winds in the Lower Missouri valley shifted to southerly, and on the 3d and 4th the same shift took place in the Upper Mississippi valley. The lowest pressure was in Dakota on the 4th. The barometer rose in Manitoba on the 5th, with northwest winds in rear of this depression. On the 6th southerly winds prevailed from the Gulf and South Atlantic coast to the Lake region, while cold north and west winds were blowing in the Northwest. On the 7th the wind directions showed that the lowest pressure was north of Lake Superior. On the 8th the lowest barometer was central north of Lake Huron. Up to this time its path had been too indefinite to be charted; it then slowly progressed in a southeasterly direction, central in Ontario, Canada; it then moved with an easterly track over New England, and disappeared off the coast of Nova Scotia on the 11th. It was accompanied on the 9th and 10th by general rains in the Lake region, Middle States and New England, which were the more abundant after the winds had shifted to colder north and west.

No. IV.—The northerly winds that had been blowing in the Northwest in rear of depression No. III, shifted on the 9th and 10th to warmer southerly in advance of the low area now to be described. On the 10th the winds in Dakota and Wyoming shifted to colder northerly, and at 11 p. m. of this date the lowest pressure was near Omaha; up to this hour no recorded precipitation accompanied this depression, but on the 11th light rain generally fell in Tennessee, the Ohio and Upper Mississippi valleys and Lake region. On the 12th the lowest pressure was in the Upper Lake region, but its track is too indefinite to be charted on that day. On the 13th the centre of the depression appears to have been in southern Michigan or northern Indiana or Ohio. On the 14th the lowest pressure was over the Lake region, but its track cannot be accurately charted. On the 15th the low area moved across the Middle States, and on the 16th along the New England coast. This depression was unusually sluggish in its progress to the east, and especially so over the Lake region, where it was detained for four days. The high temperature that prevailed, with moist southerly winds, in its southeast quadrant during its progress, had much to do in raising the temperature of the Atlantic States above the mean for the month. Copious rains fell from the Mississippi river to the Atlantic coast, and apparently with equal frequency and abundance in the east, south and west quadrants of this depression.

No. V.—On the 15th, the winds in Dakota and Nebraska shifted to southerly in advance of a depression then developing in Montana. By the 16th, the winds in the Northwest had shifted to the north and west, in rear of this low pressure, which passed beyond our stations into Canada, north of Lake Superior. Light rain accompained this low area, which mostly fell in the Southwest quadrant after the veering of the winds to colder northwest.

No. VI.—On the 17th a trough of low pressure extended from Lake Superior to Kansas, with opposing southerly and northerly winds. This low area remained nearly stationary in position, and was by the 18th filled up by the inflowing currents of air. Light rain fell on these two days in the Northwest and Lake region. No track is charted.

No. VII.—On the afternoon of the 18th, a low pressure apparently developed in the plateau east of the Rocky Mountains and north of the Platte river. On the 19th, the winds in Wyoming had veered to colder northwest, and the centre of the low area was in Dakota. On the 20th, the low area moved slowly to the east. On the afternoon of the 21st, a trough-like depression extended from the Upper Lake region to the West Gulf States, into which blew cold northerly and warm southerly winds, giving rise to copious showers that fell from the Lake region to the Gulf. On the afternoon of the 22nd, the trough of lowest pressure extended from Lake Erie to the East Gulf, with abundant precipitation confined, in general, to the limits of the isobars of lowest barometer. On the 23rd, the isobars of lowest pressure assumed the more usual elliptical form, remaining nearly stationary over the Ohio valley and Lake region. For several days the barometer had been slowly rising at the centre of the depression, and, on the 24th and 25th, being filled up by the inflowing air, it ceased to exist as a low pressure. On the 23rd and 24th, abundant rain fell in the Middle States and New England—the east quadrant of the depression. From the 22nd to the 24th, its movements were so slow that the probable track of low barometer can only be charted by a broken line, which extended on the 23rd nearly to Tennessee. This is the second instance in this month when the Lakes appear to have exercised a detaining influence on the movement of translation of a low area to the east. In this depression, as well as No. IV, rain fell in equal abundance in the east, south and west quadrants of the low area, which is an unusual circumstance in storms of the United States, in the latitudes where the tracks of these low barometers are charted.

No. VIII.—On the 23d and 24th a slight depression moved from Dakota in a northeasterly direction to the north of Lake Superior; it only possessed features of little interest, and was rapidly followed by depression No. IX.; its track is not charted.

No. IX.—On the 23d and 24th the barometer was low in Oregon and British Columbia, and the wind directions show that this depression had advanced on the 25th into Montana and Dakota. On the 26th and 27th cold northwest winds blew in Dakota and Manitoba, while southerly winds prevailed from the Gulf to the Lake region. On the 28th this depression, whose charted track is confined to the Northwest, was filled up by air inflowing from the high areas to the north and south of it respectively. While it existed abundant rain fell in its eastern quadrant, where heavy thunder-storms were generally reported.

No. X.—On the 28th the barometer fell at the North Pacific coast stations. On the 29th this depression crossed the Rocky Mountains, and there was a rapid fall of the barometer in the Northwest, where the northerly winds that had been closing up the rear of depression No. IX shifted to warmer southerly. At 4:35 p. m. of the 30th, the lowest pressure was in Minnesota, and colder northwest winds had begun to blow in Manitoba. At 7:35 a. m. of the 31st, the lowest pressure extended in a trough from Lake Superior to Nebraska between the two areas of high barometer, one on the South Atlantic coast, and the other rapidly advancing with cold northerly winds from the British Possessions. At 11 p. m. the centre of lowest pressure had moved into the St. Lawrence valley near Montreal. Considerable rain fell in the southeast quadrant of this depression, but was rapidly followed by clearing weather, due to the cold dry air furnished by the northwest winds. Its track shows that the velocity of the centre of low barometer was much the greatest of any storm during the month. The further history of this low area will belong to the *September Review*.

TEMPERATURE OF THE AIR.

In General.—The general distribution of temperature for the month is shown by the isotherms on Chart No. II. A comparison with the averages for August, during the past seven years, shows that the temperatures have been from one to two degrees above the normal throughout the Gulf and Atlantic States, St. Lawrence valley, Lake region and Minnesota, but have been about normal in the Ohio, Mississippi and Missouri valleys. On the Pacific coast, the monthly mean for San Diego is six degrees below the average; at San Francisco it is about normal, and at Portland, Or., two degrees above.

Monthly mean temperatures, at special points, have been as follows: Mt. Washington, 48°.9.

Maximum and Minimum Temperatures.—Maximum temperatures, at Signal Service stations, above 95°, have been reported as follows: 96°, Savannah, New Orleans, Leavenworth, Salt Lake City; 97°, Augusta, Galveston; 98°, Montgomery, Fort Gibson, Fort Sill, Boise City, Winnemucca; 99°, Mobile, Vicksburg, Shreveport, Denver; 100°, Indianola, Jacksboro, Concho, Dodge City; 102°, Denison, North Platte; 103°, Corsicana, Red Bluff, Visalia; 104°, Brackettville; 108°, San Antonio; 112°, Yuma; 116°, Stanwix. From stations not included in Signal Service, *extreme temperatures* have also been reported as follows: 100° at Fort Rice, Dak., Independence, Iowa.; 101° at Atlanta, Ga.; 102° at Baton Rouge, La., Chepachet, R. I., Gilmer, Clarksville and Melissa, Tex.; 103° at Fort McKavett, Tex.; 104° at New Ulm and Mesquite, Tex.; 105° at Fort Lyon, Col.; 108° at Fort McPherson, Neb., Fresno, Cal.

Minimum temperatures below 45°: 44°, Cheyenne, Marquette; 43°, Boise City; 41°, Breckenridge; 40°, Pembina; 36°, Winnemucca. It will be seen that all the minima occurred north of the 41st parallel of latitude, and excepting the one on Lake Superior, west of the 96th degree of longitude.

The maximum temperatures of the month occurred, in a general way, as follows: From the 1st to the 7th, in the Gulf States, Ind. Ter., Georgia, Tennessee, the Ohio valley and Lower Lake region; from the 17th to the 24th, in Minnesota, Lake region and New England; on the 28th and 29th, in New England and the Middle States, and on the 30th and 31st in the Missouri, central Mississippi and Ohio valleys and interior of the Southern States.

The minima occurred on the 2d and 3d, along the New England coast; on the 4th, 5th and 6th, over the Lake region, Middle States and New England; from the 15th to the 19th, in the Southern States and Ohio valley; from the 22d to the 26th, over the Western plains and Mississippi valley, and on the 31st in northern New York and New England.

Ranges of Temperature.—The largest monthly and diurnal ranges have been respectively as follows: Winnemucca, monthly, 66°, diurnal, 48°; Boise City, 55°, 39°; North Platte, 54°, 41°; Denver, 52°, 45°; Visalia, 51°, 44°; Pembina, 49°, 38°; Breckenridge, 49°, 42°; Roseburg, 47°, 40°; Red Bluff, 47°, 39°; Salt Lake City, 47°, 25°; Cheyenne, 47°, 43°; North Platte, 47°, 33°; Yankton, 47°, 31°. The least monthly and diurnal ranges have been respectively: Key West, 17° and 16°; Cape Hatteras, 21°, 16°; Wood's Holl, 22°, 15°; Charleston, 22°, 17°; New Orleans, 23°, 16°; San Francisco, 23°, 19°; San Diego, 24°, 19°; Cape May, 24°, 17°; Cape Henry, 25°, 19°; Jacksonville, 25°, 20°. It is found, by comparison, that the monthly ranges exceed in general the diurnal by about ten degrees; that the least ranges occur,